

CS4365/6365 Introduction to Enterprise Computing (Spring 2027)

Instructor

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Course Description

The course has two major learning objectives: (1) technical knowledge of modern enterprise systems and applications (ESA) and (2) skills that enable *autonomous learning* beyond the semester. The technical contents reflect the evolution of ESA in recent years, ranging from classic topics such as transaction processing to modern topics such as ML/AI (machine learning and artificial intelligence). The theoretical side will follow two directions: the Principle of Conservation of Money, based on serializability theory, and the Principle of Conservation of QoS, centered on the horizontal scalability enabled by large-scale data centers. These principles will be applied to, and illustrated by, large-scale ESA such as airlines and e-commerce.

On skill learning: The scientific skills of applying theory to practice and checking assumptions will be explained through the technical topics in modules outlined below. In addition, the evolution of ESA will illustrate advanced skills such as trend recognition with trend patterns such as specialization/generalization cycles and centralization/distribution cycles.

Course Outline

Technical information:

- Module Introduction: course format, content, skills for autonomous learning, basic concepts of modern large-scale integrated applications and services.
- Module Project: projects as learning experience, student-proposed or structured projects.
- Module AI/ML: situational awareness, big data, cyber-physical gap, LLM and new AI tools.
- Module Transactions: concurrency control and crash recovery, distributed transactions, n-tier architectures, ACID vs. BASE (the CAP theorem).
- Module QoS (Quality of Service): control and adaptation, optimization, performance and scalability of large-scale systems in cloud computing and edge computing.
- Module Services: workflow systems, service computing, service composition, microservices.

Skill learning: (practiced in project checkpoint reports and final deliverables)

- L1 Basic skills: fact vs. opinions/marketing/fiction; critical thinking.

- L2 Science skills: apply theory in practice, checking assumptions, provide factual evidence to support claims, objective self-evaluation.
- L3 Advanced skills: trend pattern recognition, distinguish appearance from substance, multi-objective optimization.

Prerequisites

Completion of one database course, or equivalent work experience.

Course Materials

- No recommended textbooks.
- Reading assignments will be research, survey, review papers, or online media, posted on Canvas.
- All course materials will be shared through Canvas.
- Students are encouraged to find and utilize the newest releases of software and learning media related to frontier models being continuously announced.

Assignments and Evaluation

Reading papers, multimedia information, and commentary assignments: The course will have a combination of traditional reading assignments (e.g., research papers) and current multimedia information (e.g., videos and podcasts). A simple written commentary with AI tool training complements the assignment.

Reproducibility exercise: Reproduce experiments from previous projects or published software to practice the skills of project evaluation and documentation with factual support.

Biweekly project checkpoint reports: Starting from week 5 and every two weeks, regular project checkpoint reports will combine a technical progress report with skills learning experience. The report consists of three main technical components and a self-evaluation. The technical components of report k are: (1) Adaptive Project Plan with starting point A_k , ending point B_k , and the steps from A_k to B_k ; (2) execution history and status report of the Project Plan k ; (3) factual supporting evidence of execution status k (github). The self-evaluation consists of an estimation of $\#Scope(plan)_k$, $\#Match(execution)_k$, and $\#Factual(supporting\ evidence)_k$. Optionally, students will provide peer reviews of other projects on their $\#Scope$, $\#Match$, and $\#Factual$, to improve their evaluation skills.

Project proposal: The project checkpoint report ($k=1$) serves as the initial project proposal. The project plan k is expected to evolve through subsequent checkpoint reports ($k=2$ to 6).

Final deliverables: The last checkpoint report with the same technical components, plus an overall project self-evaluation and final presentation video.

Project teams: Students choose between proposing their own project or participating in a structured project managed by TAs. They work in a team of 1, 2, or 3. Teams larger than 3 will require special permission from instructors. Projects should be relevant to some aspect of the course (defined broadly). The lectures in Module Project will provide guidance on project design, implementation, and adaptation to newly available technologies and tools.

Grading components (tentative):

- Attendance: 10%.
- Reading assignments and writing commentaries with AI tools: 15%.
- Project checkpoint reports: 75%. These start from the reproducibility exercise (checkpoint #0), continue with the project proposal (checkpoint #1), through the intermediate checkpoints, and the final deliverables (checkpoint #6). TAs will provide realistic feedback on the reports. The actual grades will depend on the quality of reports (according to TA's gold evaluation and the evolution of report quality throughout the semester (from #1 to #6), as well as the agreement of the gold evaluation with the self-evaluation.
- Realistic feedback: TAs will provide a gold evaluation of each checkpoint report (#Scope, #Match, and #Factual), as reference points for skill learning and training. The realistic feedback can be considered a floor function of each grade component. The final grade will be higher if responsive improvements are observed in subsequent reports.

Class Attendance

Attendance will conform to institute policy for in-residence courses. Currently, 90% attendance will be considered as having achieved full attendance credits.

Academic Integrity and Collaboration

We expect academic honor and integrity from students. Please study and follow the academic honor code of Georgia Tech: [<http://www.honor.gatech.edu/content/2/the-honor-code>].

Non-Discrimination

The Institute does not discriminate against individuals on the basis of race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, or veteran status in the administration of admissions policies, educational policies, employment policies, or any other Institute governed programs and activities. The Institute's equal opportunity and non-discrimination policy applies to every member of the Institute community.

For more details, see [<http://www.policylibrary.gatech.edu/policy-nondiscrimination-and-affirmative-action>].

